

The Relationship between Neurology Disorder and Impacted Tooth- A Narrative Review

Indra Mulyawan^{1*}, Andra Rizqiawan¹, Leanita Berliani², Secha Amelia², Muhammad Abdul Mukti²

1. Departement of Oral and Maxillofacial Surgery, Faculty of Dental Medicine, Airlangga University, Surabaya, Indonesia.

2. Undergraduate Student, Faculty of Dental Medicine, Airlangga University, Surabaya, Indonesia.

Abstract

Impacted teeth is one that fails to erupt into the oral cavity within the estimated time. Neurological disorder are diseases of the central nervous system caused by injury to the brain, spinal cord, or nerves. The examples of neurological disorders are neuralgia and cephalgia.

Impacted teeth can put persistent pressure on nerve endings and cause pain in the form of headaches which can reduce the patient's quality of life. In a population with impacted teeth, 53.33% complained a rather disturbing headache and 13.33% of the sample complained headaches that interfered with their activities. Studying the relations between neurological disorder and impacted teeth.

Impacted teeth may be associated with neurological disorders such as neuralgia and cephalgia due to persistent pressure from impacted teeth on the nerve endings in contact with them. Impacted teeth may be associated with neurological disorders such as neuralgia and cephalgia.

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Introduction

Impacted teeth is one that fails to erupt into the oral cavity within the estimated time. The lower third molars, canines, second premolars, and supernumerary teeth are the most often impacted teeth.¹ A tooth can be impacted due to lack of space, dense layers of bone or thick soft tissue, chronic infection, and abnormalities in teething.²

Neurological disorders are diseases of the central nervous system resulting from injury to the brain, spinal cord, or nerves. In other words, neurological disorders affect the central or peripheral nervous system.³

Both dentists and oral surgeons commonly encounter the clinical issue of impaction. They should be well-versed on the warning signs and symptoms of this ailment as well as some of the preventative measures. The

presence of an impacted tooth sometimes cannot be detected because of the absence of perceived symptoms. However, impacted teeth can also cause pain and discomfort. The pain felt can be in the form of a dull pain in the jaw that spreads to the neck, head, and temporal region, or just a pain in the head. Complaints that are often complained of is feeling uncomfortable to do things related to the oral cavity. Common symptoms of impacted teeth include inflammation or swelling of the area around the jaw and redness of the gingiva around the impacted tooth, resorption of neighboring teeth, cysts, pain around the gingiva or jaw, prolonged headache (neuralgia), and jaw fracture.⁴ In a population who experienced impacted teeth, it was shown that 53.33% of the sample complained of a somewhat disturbing headache and 13.33% of the sample complained of headaches that interfered with activities.⁵ The headache that is complained of usually occurs in the temporal and occipital areas. The pain in the head was suspected to be related to the impacted tooth that suffered.

Pain is the body's protective mechanism to alert you that tissue damage is happening or is about to occur.⁶ The type of pain felt can vary. Referred pain is pain that is felt not in the area of origin of the tissue that causes pain.⁷

*Corresponding author:

Indra Mulyawan,
Departement of Oral and Maxillofacial Surgery, Faculty of
Dental Medicine, Airlangga University
Mayjend. Prof. Dr. Moestopo Street No. 47, Surabaya 60132,
Indonesia.
E-mail: indramulyawan@fkg.unair.ac.id; secha.amelia-
2020@fkg.unair.ac.id

Neuropathic pain is pain that results from injury or dysfunction of the somatosensory system.⁸ Neuropathic pain is classified as peripheral or central depending on the area of origin of the pain.

This pain arises due to injury or disease to the sensory nerve fibers caused by various factors such as radiation, inflammation, infection, and trauma.⁹ Symptoms of neuropathic pain may include neuropathic areas (hyperaesthesia or hypoaesthesia), changes in sensation (paresthesia, dysesthesia), pain (neuralgia or burning), or a combination of these symptoms. The pain or sensations felt may occur spontaneously or occur (allodynia and hyperalgesia).¹⁰ The most common neuralgia is trigeminal neuralgia with a prevalence of 4.3 cases per 100,000 population. The perceived neuralgia is more common on the right side of the face compared to the left with a ratio of 1.5:1.¹¹ In addition to neuralgia, pain symptoms that are often experienced are cephalgia or headaches. Headache is the most common complaint often encountered in neurological cases.¹²

The relationship between pain and impacted teeth is thought to originate from the neurological system in the face and head areas that are interconnected with each other. In one study, it was found that approximately 25.86% of a sample from a population with impacted teeth had cephalgia.⁵ An impacted tooth can put persistent pressure on the nerve endings that come into contact with it and cause pain.¹³ The pain felt can reduce the patient's quality of life because of the uncomfortable feeling felt.⁵

The purpose of this review is to analyzing the relationship between neurological disorders and impacted teeth.

IMPACTED TOOTH

An impacted tooth is a tooth that cannot erupt into the oral cavity within the expected time frame and is a common case. Tooth impaction often occurs in canines, second molars, and most often third molars.¹ The presence of impacted teeth that cannot erupt can cause pathology and complications due to their proximity to other anatomical structures such as neighboring teeth, periodontal ligament, etc. One of the other anatomical structures that can be disturbed by the presence of impacted teeth is the nerve. Therefore, the presence of impacted teeth can often cause neuralgic pain or

headaches that are very disturbing to the sufferer.¹⁶

CORRELATION HEADACHE WITH THE PRESECEENCE OF IMPACTED TOOTH

Several studies reported complaints of headaches that occurred along with the presence of impacted teeth. In a case report written by Iswanto in 2015, a 12-year-old patient came to the General Hospital with the chief complaint of continuous left headache. After a clinical examination, it was discovered that all of the patient's permanent teeth had grown except for the upper left canine which still had its primary teeth. After palpation, felt a sharp protrusion towards the cranium under the ala nasi. On radiographic examination, it was seen that the impaction of tooth 23 was in an inverted position or the crown of the tooth was inverted cranially. After odontectomy, the headache disappeared. The author writes that this occurs because of the stimulation of nerve endings or pressure on the nerves of the superior and middle alveolar nerves. This incident does not only occur in impacted canines.² In a case report written by Tammama in 2018, a 23-year-old patient complained of frequent headaches since about 5 years ago, the pain was felt in the patient's left temple area. The patient also complained of pain in the left upper jaw. After clinical and radiographic examination, it was found that the patient had impacted maxillary M2 teeth on the right and left and both were in a horizontal class III C position with the crown distally. The patient was diagnosed with neuralgia due to impaction of the left maxillary second molar. After the odontectomy, the headache disappeared and never reappeared.

The author also wrote that the headache occurred because the left upper second molar compresses the various nerve endings that come into contact with it persistently causing tenderness in the vestibule area and referred pain in the left temporal. Of all the teeth that can be impacted, third molars are ranked first as the teeth most frequently impacted.¹³

In a study conducted by Fitri in 2016, a total of 25.86% of the total 58 impacted samples suffered from cephalgia or headache. The author mentions that the cephalgia occurs because there is pressure on the nerves that are diverted to some part of the fifth nerve or which anastomoses with the fifth nerve or trigeminal nerve.⁵

REFERRED PAIN DUE TO PERSISTENT TOOTH ROOT CONTACT WITH NERVES

Neurological disorders that are suffered simultaneously with impacted teeth, all of them have similarities with the mention of persistent pressure from the impacted tooth to the nerve endings that are in contact with it. In the case of impacted canines, they grow palatally. Then in the case of impacted second and third molars, each grows in a horizontal position. All three grew in a total impaction position. This results in a close relationship between the root of the tooth and the nerve. The roots of impacted canines can contact the anterior superior alveolar nerve, as well as the roots of impacted maxillary second molars and mandibular third molars that can contact the posterior superior alveolar nerves and the posterior inferior alveolar nerves. The contacted roots exert persistent pressure on the nerve endings which causes referred pain symptoms.¹³

Referred pain is pain that is felt in an area different from the stimulation it receives.¹⁴ Referred pain that occurs can be caused by impacted tooth roots that are in persistent contact with nerves which act as noxious stimuli that can activate nociceptors which are free nerve endings from trigeminal nerve sensory afferents.

The pain signal is transmitted via afferent fibers to the spinal trigeminal nucleus caudalis from the brainstem and then synapses with second-order neurons that project to the somatosensory and limbic cortex via the thalamus.¹⁵ In the brainstem, afferent nerve fibers converge from other areas of the same nociceptive neuron, causing the somatosensory cortex to receive the same pain signals. Nociceptive neurons in the brainstem can receive convergence or input that overlaps with input from other areas of the body which makes the brain unable to correctly identify the real source of the input.¹⁴ This allows the occurrence of cephalgia because the trigeminal nerve, one of whose branches innervates the tooth, is the dominant nerve conveying sensory stimuli from the orofacial area to the central nervous system.⁵

CEPHALGIA

Cephalgia or headache is the most common complaint found in neurological cases with a very high prevalence of up to 96%.¹⁷

Cephalgia itself is a headache that is transferred from the inner structure to the surface of the head.⁶ Headaches are referred from

intracranial to superficial because of the common nerves that innervate them. Most of the intracranial and extracranial tissue sensory nerve fibers originate from the trigeminal nerve ganglion (cranial nerve V).¹⁸

NEURALGIA

In addition to cephalgia, there are other complaints, namely neuralgia. Neuralgia is pain in one or several nerves due to pressure or irritation of the peripheral nerve structures.¹⁹ Pain that is felt is unilateral following the distribution of the trigeminal nerve (cranial nerve V).¹¹ Neuralgia occurs because the position of the impacted tooth is thought to be the trigger point of the patient's headache. Trigger point itself is a point of hyperirritation that causes pain locally or referred pain that is far from the cause.¹³

MECHANISM REFERRED PAIN CAUSED BY IMPACTED TEETH

The mechanism for referred pain originates from the convergent projection theory which states that when sensory afferent fibers from different sites converge on the same nociceptive neurons in the spinal cord or brainstem, they can send the same pain signal to the cerebral cortex.¹⁴ Meanwhile, the mechanism for the occurrence of referred pain caused by impacted teeth that specifically and clearly explains the pathophysiology resulting in neuralgia or cephalgia has not been found. Therefore, it is hoped that research that specifically examines the relationship between neurological disorders and impacted teeth can answer the relationship between the two variables more systematically.

Conclusions

Impacted teeth with a total impaction position can cause neurological symptoms to appear. Neurological disorders associated with impacted teeth are cephalgia and neuralgia. The occurrence of cephalgia is caused by the presence of a referred pain mechanism from the actual location of the origin of pain stimuli, while for neuralgia the exact mechanism is not known.

Declaration of Interest

The authors report no conflict of interest.

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